

U.S. Department of Energy
Technical Qualification Program

Technical Training Topical Area

Study Guide

For the

*Facility Maintenance Management
Qualification Standard*

August 1996



Competency 2.2 Facility maintenance management personnel shall demonstrate a working level knowledge of the requirements for training and qualification program as identified in the following Department of Energy (DOE) Orders:

- DOE Order 5480.20, Personnel Selection, Qualification, Training, and Staffing Requirements at DOE Reactor and Non-Reactor Nuclear Facilities
- DOE Order 4330.4B, Maintenance Management Program

1. Supporting Knowledge and Skills

- a. Discuss the meaning of qualification and its importance to maintenance.
- b. Describe the purpose and scope of DOE Order 5480.20, Personnel Selection, Qualification, Training, and Staffing Requirements at DOE Reactor and Non-Reactor Nuclear Facilities.
- c. Discuss why certain skills or proficiencies should be demonstrated periodically.
- d. Using DOE Order 5480.20, Personnel Selection, Qualification, Training, and Staffing Requirements as a reference, describe the general requirements to which a Management and Operating (M&O) contractor is held at Category 1, 2, and 3 facilities in the following areas:
 - Qualification and certification of facility personnel
 - Training and qualification of sub-contractors
 - Continuing training and requalification
 - Exceptions and alternatives to requirements of DOE Order 5480.20
 - Personnel selection
 - Training and qualification
- e. Using DOE Order 5480.20, Personnel Selection, Qualification, Training, and Staffing Requirements as a reference, state the entry level requirements for various facility positions.
- f. Describe the purpose and scope of Chapter II, Section 3, of DOE Order 4330.4B, Training and Qualification of Maintenance Personnel.
- g. Discuss the responsibility of the maintenance organization in the training and qualification of their personnel.
- h. Discuss the requirements of Chapter II, Section 3, DOE Order 4330.4B, Training and Qualification of Maintenance Personnel, regarding training facilities.



- i. Describe the elements of an effective on-the-job training program.
- j. Discuss the maintenance manager's responsibilities in the approval, effectiveness, and feedback cycles of the maintenance training program.

2. Self-Study Activities

- NOTES:
- The DOE Orders are in a state of transition. Please refer to the following gopher site for a cross reference of new and old Orders:
gopher://VM1.HQADMIN.DOE.GOV:70/00/doemenu1/directiv/251cross.asc
 - Below are two web sites containing many of the references you may need.

Web Sites		
Organization	Site Location	Notes
Department of Energy	http://cted.inel.gov/cted/index.html	DOE Standards, Guides, and Orders.
U.S. House of Representatives	http://law.house.gov/cfr.htm	Searchable Code of Federal Regulations

NOTE: DOE Order 5480.20, *Personnel Selection, Qualification, Training, and Staffing Requirements at DOE Reactor and Non-Reactor Nuclear Facilities* was replaced by 5480.20A, *Personnel Selection, Qualification, and Training Requirements for DOE Nuclear Facilities*.

Read Chapter I of DOE Order 5480.20A, *Personnel Selection, Qualification, and Training Requirements for DOE Nuclear Facilities*.

Read Section 3.1.4 and Chapter II, Section 3, of DOE Order 4330.4B, *Maintenance Management Program*.

- EXERCISE 2.2-A Discuss the meaning of qualification and its importance to maintenance.
- EXERCISE 2.2-B What are the purpose and scope of DOE Order 5480.20A, *Personnel Selection, Qualification, and Training Requirements for DOE Nuclear Facilities*?
- EXERCISE 2.2-C Discuss why certain skills or proficiencies should be demonstrated periodically.



- EXERCISE 2.2-D Describe the general requirements to which a Management and Operating contractor must meet for the following areas:
- Qualification and certification of facility personnel
 - Training and qualification of sub-contractors
 - Continuing training and requalification.
 - Exceptions and alternatives to DOE Order 5480.20A requirements
 - Personnel selection
 - Training and qualification
- EXERCISE 2.2-E Using DOE Order 5480.20A as a reference, state the entry level requirements for various facility positions.
- EXERCISE 2.2-F Describe the purpose and scope of Chapter II, Section 3, of DOE Order 4330.4B.
- EXERCISE 2.2-G Discuss the responsibility of the maintenance organization in the training and qualification of their personnel.
- EXERCISE 2.2-H Discuss the requirements of Chapter II, Section 3 of DOE Order 4330.4B regarding training facilities.
- EXERCISE 2.2-I Describe the elements of an effective on-the-job training program.
- EXERCISE 2.2-J Discuss the maintenance manager's responsibilities in the approval, effectiveness, and feedback cycles of the maintenance training program.

3. Summary

DOE's objectives are to ensure the development and implementation of contractor-administered training programs that provide consistent and effective training for personnel at DOE nuclear facilities. DOE Orders 5480.20A and 4330.4A contain minimum requirements that must be included in contractor training and qualification programs for maintenance personnel. The requirements are based on DOE, Nuclear Regulatory Commission (NRC), and related industry standards, and are applicable to all operable DOE nuclear facilities. Because the operation of DOE reactor and non-reactor nuclear facilities involves certain risks to employees, the public, and the environment, well-trained and qualified operating organization personnel are of extreme importance. A vital element in ensuring a well-trained and qualified work force is the implementation of the systematic approach to training (SAT). This approach has proven effective in the commercial nuclear power industry and in other major industries; therefore, the Department requires that training programs for personnel in the operating organizations at DOE nuclear



facilities are established using SAT. Experience has also shown that better-operating nuclear facilities have well-defined, effectively administered policies and procedures to control the activities associated with personnel training. The Orders require the establishment and implementation of training-related procedures.

4. Exercise Solutions

EXERCISE 2.2-A Discuss the meaning of qualification and its importance to maintenance.

ANSWER 2.2-A Qualification is defined in terms of education, experience, training, examination, and any special requirements necessary for performance of assigned responsibilities.

Training and qualification programs are important to develop and maintain the knowledge and skills required by maintenance personnel to effectively perform maintenance activities.

EXERCISE 2.2-B What are the purpose and scope of DOE Order 5480.20A, *Personnel Selection, Qualification, and Training Requirements for DOE Nuclear Facilities*?

ANSWER 2.2-B The purpose of DOE Order 5480.20A is as follows: “To establish selection, qualification, and training requirements for management and operating (M&O) contractor personnel involved in the operation, maintenance, and technical support of Department of Energy-owned (DOE-owned) Category A and B reactors and non-reactor nuclear facilities.”

The Order is applicable to all Departmental Elements which are responsible for operable DOE-owned Category A and B reactors and non-reactor facilities. The Director, Naval Nuclear Propulsion Program, is exempt from this Order. Attachment 1 sets requirements that are to be applied to the universe of contractors awarded DOE management and operating contracts involving operable DOE-owned Category A and B reactors and non-reactor nuclear facilities. (Paragraph 3)



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EXERCISE 2.2-C Discuss why certain skills or proficiencies should be demonstrated periodically.

ANSWER 2.2-C Certain skills should be demonstrated periodically to ensure adequate maintenance of the required skills. This is especially important for skills that are performed infrequently but are difficult to perform and are very important to safe operations.

EXERCISE 2.2-D Describe the general requirements to which a Management and Operating contractor must meet for the following areas:

- Qualification and certification of facility personnel
- Training and qualification of sub-contractors
- Continuing training and requalification.
- Exceptions and alternatives to DOE Order 5480.20A requirements
- Personnel selection
- Training and qualification

ANSWER 2.2-D The following matrix outlines the location of DOE Order 5480.20A requirements for the listed areas.

Area	DOE Order 5480.20A Citation
Qualification and certification of facility personnel	Chapter I, Paragraphs 5 and 6
Training and qualification of sub-contractors	Chapter I, Paragraph 3
Continuing training and requalification	Chapter I, Paragraphs 7.d. and 10
Exceptions and alternatives to DOE Order 5480.20A requirements	Chapter I, Paragraphs 11 and 13
Personnel selection	Chapter I, Paragraph 4
Training and qualification	Chapter I, Paragraphs 5 and 7



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EXERCISE 2.2-E Using DOE Order 5480.20A as a reference, state the entry level requirements for various facility positions.

ANSWER 2.2-E The following matrix outlines the location of DOE Order 5480.20A entry-level requirements for the listed positions.

Position	Category A Facilities	Category B Facilities	Non-Reactor Facilities
Managers	Chapter II, Paragraph 2.a.	Chapter III, Paragraph 2.a.	Chapter IV, Paragraph 2.a.
Supervisors	Chapter II, Paragraph 2.b.	Chapter III, Paragraph 2.b.	Chapter IV, Paragraph 2.b.
Operators	Chapter II, Paragraphs 2.e.(1) and (2)	Chapter III, Paragraph 2.c.	Chapter IV, Paragraph 2.c.
Technicians	Chapter II, Paragraph 2.e.(3)	Chapter III, Paragraph 2.d.	Chapter IV, Paragraph 2.d.
Maintenance Personnel	Chapter II, Paragraph 2.e.(4)	Chapter III, Paragraph 2.e.	Chapter IV, Paragraph 2.e.
Technical Staff	Chapter II, Paragraph 2.c.	Chapter III, Paragraph 2.f.	Chapter IV, Paragraph 2.f.
Training Organization Personnel	Chapter II, Paragraph 2.d.	Chapter III, Paragraph 2.g.	Chapter IV, Paragraph 2.g.

EXERCISE 2.2-F Describe the purpose and scope of Chapter II, Section 3 of DOE Order 4330.4B.

ANSWER 2.2-F The purpose of this section is to describe the implementation of training and qualification programs for maintenance personnel. Guidance is also provided for training program evaluation and recordkeeping.

EXERCISE 2.2-G Discuss the responsibility of the maintenance organization in the training and qualification of their personnel.

ANSWER 2.2-G The maintenance manager and supervisors should be directly involved in training maintenance personnel. This involvement should, as a minimum, include close coordination with the contractor training organization to establish and maintain course content and emphasis, determine and support training schedules, accomplish on-the-job training (OJT), and provide feedback to adjust course content and emphasis, as necessary.



The training organization should maintain maintenance training programs that meet the intent of established industrial guidelines and that address specific company and facility needs. These training programs are supported and guided by the maintenance organization. This support and guidance normally includes all or a portion of the following tasks:

- Defining the jobs, tasks, skill levels, and responsibilities of individuals in these positions;
- Defining training programs for each position;
- Determining the content and emphasis of the training needed;
- Determining and supporting training schedules;
- Determining the training needs of and tailoring the training program for each individual based on his previous education, training, experience, and skill level;
- Providing instructors and trainers;
- Establishing qualification criteria, with emphasis on successful performance in the field;
- Coordinating the conduct of, and instruction during, OJT;
- Qualifying individuals as they complete their training programs; and
- Providing training-effectiveness feedback to the training organization to enhance and, where necessary, adjust course teaching methods, content, and emphasis.

EXERCISE 2.2-H Discuss the requirements of Chapter II, Section 3 of DOE Order 4330.4B regarding training facilities.

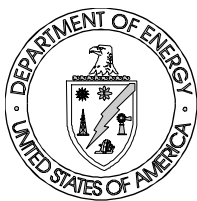
ANSWER 2.2-H Facilities to support maintenance training are a key consideration in obtaining safe, efficient, and high-quality maintenance. The maintenance manager should be involved in the construction of new maintenance training facilities and renovations to existing facilities. Considerations for these facilities and equipment should include the following:

- Training class size;
- Type of training (e.g., classroom, laboratory, on-the-job training);
- Use of mockups;
- Environmental controls;
- Services (e.g., electricity, air, water, and gas);
- Training equipment (e.g., lecture boards, projectors, and screens, and simulators); and
- Equipment similar to that installed in the plant for practical training.



EXERCISE 2.2-J Discuss the maintenance manager's responsibilities in the approval, effectiveness, and feedback cycles of the maintenance training program.

ANSWER 2.2-J The maintenance manager should be directly involved in approving and periodically reviewing the maintenance training program. The performance of maintenance personnel should be monitored to identify initial and continuing training program enhancements and emphasis. (Sections 15, 16, and 17 of DOE Order 4330.4B provide guidance on monitoring maintenance performance.) The trainee's feedback on his perception of and suggestions for improving the training program should be obtained. Any performance trends that indicate maintenance knowledge or skills needing improvement should be considered during the review of the maintenance training programs. Changes to the training programs by the training organization should include recommendations from the maintenance manager.



Competency 4.12 Facility maintenance management personnel shall demonstrate the ability to conduct independent assessments of the contractor's maintenance training and qualification program(s) in accordance with DOE Order 4330.4B, Maintenance Management Program, and DOE Order 5480.20, Personnel Selection, Qualification, Training, and Staffing Requirements at DOE Reactor and Non-Reactor Nuclear Facilities.

1. Supporting Knowledge and Skills

- a. Conduct an evaluation of a contractor training and qualification program to verify that qualification requirements have been specified for job categories.
- b. Given a work activity that requires special skills or abilities, verify that personnel are qualified prior to performing the work.
- c. Assess a work activity requiring specific qualifications to verify that sub-contractors performing the work are qualified to the same level as contractor personnel.
- d. Assess the instructor qualifications for a selected maintenance training program to verify that instructors have the necessary credentials and skills to provide the training.

NOTE: DOE Order 5480.20 was replaced by DOE Order 5480.20A.

2. Self-Study Activities

- NOTES:
- The DOE Orders are in a state of transition. Please refer to the following gopher site for a cross reference of new and old Orders:
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Organization	Site Location	Notes
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U.S. House of Representatives	http://law.house.gov/cfr.htm	Searchable Code of Federal Regulations



EXERCISE 4.12-A Review the self-study activities listed in Facility Maintenance competency 2.2 for an overview of the training and qualification requirements.

Read Chapter II, Section 3, of DOE Order 4330.4B, *Training and Qualification of Maintenance Personnel*.

EXERCISE 4.12-B List the four points for performing a review of contractor qualification as noted in DOE Order 4330.4A, *Maintenance Management Program*, Chapter II, Section 3.3.5.

Review Attachments 28, 29, 31, 34, 35, 38, 39, 41, 42, and 48 of DOE-HDBK-1078-94, U.S. Department of Energy, *Training Program Handbook: A Systematic Approach to Training*.

Read pages 41 through 43 of DOE-STD-1070-94, U.S. Department of Energy Standard, *Guidelines for Evaluation of Nuclear Facility Training Programs*.

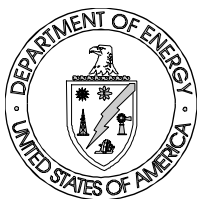
EXERCISE 4.12-C Using DOE-STD-1070-94, pages 41 through 43, list the seven criteria identified for training program evaluation.

3. Summary

The facility's training organization and programs should be evaluated periodically to determine whether they are achieving the established goals and objectives. The effectiveness of training programs to produce qualified personnel should also be evaluated periodically. This should be accomplished by reviewing operating occurrences, interviewing job incumbents and first-line supervisors, observing operations, etc. The results of these evaluations, if used correctly, will help assure a facility of safe, efficient, and reliable operations.

The following considerations should be emphasized when evaluating training and qualification programs:

- Responsibility for monitoring indicators, analyzing data, and approving revisions is clearly defined.
- The training department is alerted to facility operating, maintenance, and industrial safety experiences in a systematic manner.
- Communication on training effectiveness occurs regularly between plant supervisors and the training department.
- Employee opinion of the quality and effectiveness of training is collected periodically and analyzed to identify opportunities for improvement.

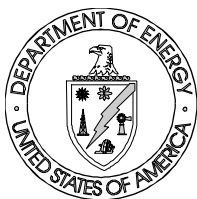


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- The training department is alerted to employee performance errors that may indicate a problem with the training program, or an opportunity to initiate further training.
- The training department meets periodically with maintenance and operations, supervisors and engineers to determine potential training problems.
- Training uses facility inspection and evaluation reports to guide program revisions.
- Facility modifications and procedure changes are monitored for training consequences.
- Training monitors industry operating and maintenance experiences for program impacts.
- Regulatory changes are reviewed for training consequences.
- Program performance data is analyzed to identify trends which may impact, or be impacted by training.
- Proposed changes are reviewed by appropriate facility and training personnel.
- Training changes are tracked in a systematic manner.

Evaluation of a technical training and qualification program activity typically includes the following criteria, as a minimum:

Evaluation of a Technical Training and Qualification Program	
Criteria	Applications
Are the materials prepared at a level of skills and knowledge appropriate to the trainees?	Determine whether material content can be related to expected entry-level skills and knowledge, including appropriate reading level of the trainees.
Are the materials clearly written and presented so the trainee can complete the required learning activities?	Determine whether selected trainees can use the materials and complete the learning activities.
Do the materials reflect the learning objectives of the desired program?	Assess the material, comparing the learning objectives to those of the desired program, and determine which learning objectives are not adequately covered.
Are the materials consistent with other materials used in the training program or the mastery of the learning objectives?	Analyze sets of materials to determine whether they are supportive and provide an effective progression of learning.



Evaluation of a Technical Training and Qualification Program	
Criteria	Applications
Do the materials conform to the learning activities of the desired program?	Analyze the materials, comparing the learning activities to those of the desired program. Identify any deficiencies.
Are the materials practical for use in the given facility situation?	Determine whether the materials can be used in facilities with available equipment, time, and space, and with the number of trainees planned.

4. Exercise Solutions

EXERCISE 4.12-A Review the self-study activities listed in Facility Maintenance competency 2.2 for an overview of the training and qualification requirements.

ANSWER 4.12-A Refer to exercise solutions listed in Facility Maintenance competency 2.2.

EXERCISE 4.12-B List the four points for performing a review of contractor qualification as noted in DOE Order 4330.4A, *Maintenance Management Program*, Chapter II, Section 3.3.5.

ANSWER 4.12-B In conjunction with the training organization, maintenance management should review an individual's training accomplishments prior to qualifying him for a given task. A similar method should be established to review the qualification of contractor personnel. This review should include the following:

- Verifying completion of all designated prerequisite training
- Conducting or evaluating the results of a final written, oral, or practical demonstration examination and evaluating the recommendations of the individual's supervisors
- Interviewing the individual regarding the knowledge and skill he has acquired (not as a verification to total expertise and proficiency but as an indicator of competency upon which to build)
- Formal qualification approval and documentation



EXERCISE 4.12-C Using DOE-STD-1070-94, pages 41 through 43, list the seven criteria identified for training program evaluation.

ANSWER 4.12-C

Criteria for Training Program Evaluation as noted in DOE-STD-1070-94	
Criteria	Statement
8.1	A comprehensive evaluation of individual training programs is conducted by qualified individuals on a periodic basis to identify program strengths and weaknesses.
8.2	Instructional skills and technical competencies of instructors are evaluated regularly.
8.3	Feedback from trainee performance during training is used to evaluate and refine the training program. Feedback from former trainees and their supervisors is used to evaluate and refine the training program.
8.4	Change actions (e.g., procedure changes, equipment changes, facility-specific and operating experience) are monitored and evaluated for their applicability to initial and continuing training programs and are incorporated in a timely manner. Changes in job scope are evaluated to determine the need for revision of initial and continuing training programs.
8.5	Improvements and changes to initial and continuing training are systematically initiated, evaluated, tracked, and incorporated to correct training deficiencies and performance problems.
8.6	Training materials are maintained current, based upon the results of training program evaluations.
8.7	Training facilities are evaluated to determine their effect on the training process.